PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Kenichiro Sato et al.

Appln. No.: 09/834,639

Filed: April 16, 2001

Group Art Unit: 1752

Examiner: CLARKE, YVETTE M

For: POSITIVE PHOTORESIST COMPOSITION

DECLARATION UNDER 37 C.F.R. §1.132

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

I, Kenichiro Sato, do declare and state as follows:

I am a citizen of Japan.

I graduated from Osaka University, Faculty of Engineering, Course of Applied Fine Chemistry in March 1992.

Since April 1992 I have been employed by Fuji Photo Film Co., Ltd. and have been engaged in research and development of photoresist photosensitive materials for semiconductors at the Yoshida-Minami Factory Research Division of the company.

I am a co-inventor of the invention described and claimed in the above-named application, and I am familiar with the subject matter disclosed by the application.

In order to demonstrate the unexpected superiority of the present invention, the following experimentation was conducted by me or under my supervision.

EXPERIMENTATION

EXAMPLES A1 TO A4 AND COMPARATIVE EXAMPLES A1 TO A2

Positive photoresist compositions using the resin, the photo-acid generator, the surface active agent and the basic compound, which are set forth in Table A below were prepared in the same manner as in Examples 2-1 to 2-18 of the present specification.

In Table A, Resins (1), (2), (3) and (9), PAG4-50 are compounds described in the present specification, respectively. The Polymer (35), PAG 1, PGMEA, FC-430 and tributylamine are compounds described in U.S.P. 6,280,898 (Hasegawa).

The positive photoresist compositions were evaluated on Edge Roughness (ER) and Number of Developing Defects in the same manner as in Examples 2-1 to 2-18 of the present specification. The results are shown in Table A below.

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TABLE A

	Resin (2g)	Acid Generator (110mg)	Solvent	Surfactant (5mg)	Organic Basic Compound (5mg)	ER	Number of Development Defects
Example A1	1	PAG 4-50	PGMEA	FC430	Tributylamine	12 nm	38
Example A2	2	PAG 4-50	PGMEA	FC430	Tributylamine	14 nm	45
Example A3	3	PAG 4-50	PGMEA	FC430	Tributylamine	12 nm	40
Example A4	9	PAG 4-50	PGMEA	FC430	Tributylamine	12 nm	35
Comparative Example A1	Polymer (35)	PAG 4-50	PGMEA	FC430	Tributylamine	20 nm	1280
Comparative Example A2	Polymer (35)	PAG 1	PGMEA	FC430	Tributylamine	25 nm	2320

In the Comparative Examples A1 and A2, Polymer (35) was used which has a structure closest to the resin for use in the present invention of the resins of Hasegawa. The acid generator in Comparative Example 2 was the acid generator described in the examples of Hasegawa.

In the comparison between Examples A1 to A4 and Comparative Examples A1 and A2, it has been recognized that even use of the polymer (35) that is specifically disclosed in Hasegawa and has a structure resembling most the resins of the present invention fails to present the excellent effect of the present invention in view of ER and Number of development defects.

Use of the particular resins containing the repeating unit of the formula (I), the repeating unit of the formula (NII) and any one of the repeating units including the compound of the formulae (I-1) to (I-4) of the invention brings about the unexpected excellent effect to the invention, and accordingly the present invention cannot be an invention obvious from Hasegawa in which no resins having these particular repeating units are specifically disclosed at all.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectively submitted,

Date: Feb. 12, 2003

Kenichiro Sato

Kenichiro Sato